2017 Solar Eclipse Cosmic Ray Project

A unifying project for centers considering cosmic ray studies this summer

Join us! We invite teachers and your students to measure the rate of cosmic rays near the sun during America's Solar Eclipse on August 21, 2017.

Set up a detector during the moon's transit across the sun to record muon trajectories during the three-hour eclipse, rain or shine.

Help determine the size of the sun's contribution to cosmic ray muons that reach the earth's surface.

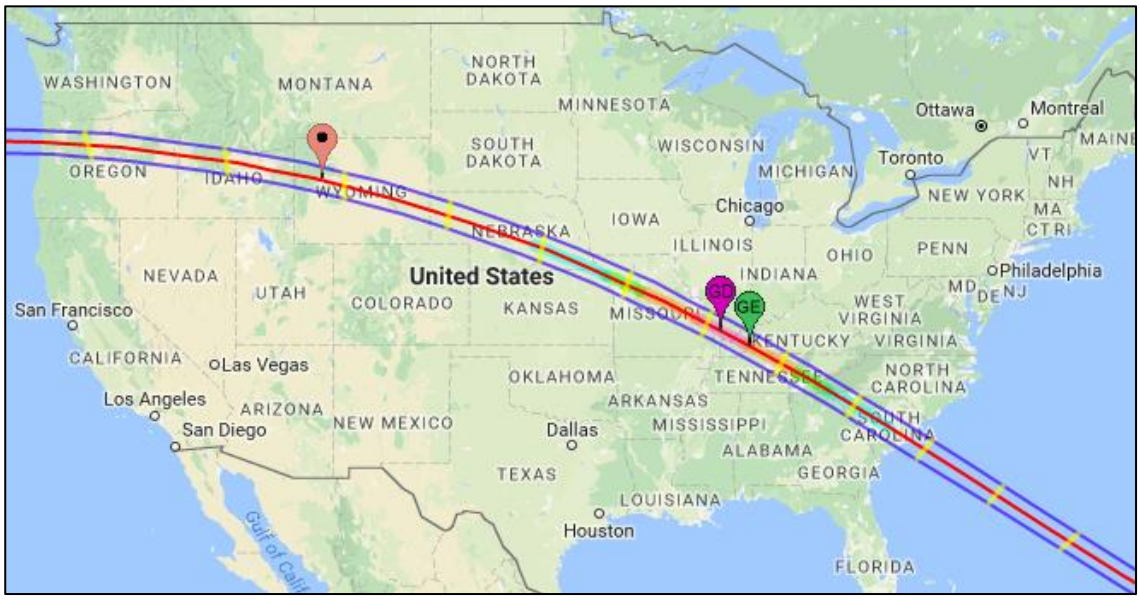
Goals:

1. Determine whether the sun is a source of cosmic rays.
2. Measure the shadow that the sun and moon cause in the cosmic ray flux.
3. Search for unknown effects during the eclipse that modify the rate of cosmic rays.
4. Create a database of muons in the direction of the sun from many locations nationwide to help look for other effects, including any dependence on latitude.

Everyone with a cosmic ray detector can participate! Some teachers will travel with their students to locations in the total eclipse path, but everyone in the continental U.S. will see the moon block a large percentage of the sun.

Let us know if you are interested or if you have questions.

Contact: Nate Unterman (nunterman@gmail.com) or Mark Adams (adams@fnal.gov)

> 

Details: QuarkNet envisions a cosmic ray telescope assembled from existing CRMD counters (see figure below) mounted on a telescope stand that can track the sun. A shadow cast by targets on the telescope will provide fine alignment towards the sun. Muons coming from the direction of the sun will be selected by a coincidence of A-B-C counters. The Veto counter can be used to reduce background generated by two muons from other directions. C-Veto coincidences will provide a normalization sample that is almost independent of the azimuthal angle of the telescope.

We are designing a stand from 3m-long PVC pipes that any group can reproduce. High school student groups are currently measuring muon rates for various detector arrangements. Preliminary results indicate that there are 10 muons per minute within the ~10-degree acceptance of this detector. Finally, we plan to carry out initial trial runs with a prototype detector before the end of the school year.